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The Ordering of Derivational Tone Rules in Yoruba*

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1. Introduction

Although Yoruba has a surface structure which is tonally very diversified, it is generally accepted that it has an underlying structure of only three tones which, moreover, are level. A set of rules is needed to derive this surface structure from the underlying one. By tone rule in this paper is meant any rule which plays a role in determining in part the surface tonal structure of a sentence. These rules have to be ordered carefully, as will be indicated below.

2. Two Types of Tone Rules

When discussing the ordering of derivational tone rules in Yoruba, it may be useful to distinguish two types of rules: (1) syntactic tone rules, those with a syntactic function or that are triggered by a syntactic environment, and (2) phonetic tone rules, those that have no syntactic function and are triggered by a phonetic environment. As an example of the first kind we can take the tonal changes operating under certain conditions in nouns when they function as the subject of a sentence preceding the predicate (Rule 8). As an example of the second type, we can take the tone spreading rule[1] which governs the changing of a high tone to low-high rising when following a low, and the low becoming high-low falling when following a high (Rule 11).

3. Suggested ordering[2] (to be discussed in detail below):

3.1. Syntactic Tone Rules

R1. Possessive tone junction

(before R1)	(After R1)	(gloss)
ọkọ mi	> ọkọ̀ mi	'my husband'
ilé Báyọ̀	> ilée Báyọ̀	'Bayọ's house'

R2. High-tone junction verbs

iyán dùn jẹ	> iyán dùnún jẹ	'pounded yam is tasty'

R3. Low-tone-junction adjectives

ọmọ kan	> ọmọ̀ kan	'a child'

R4. Emphatic sentence-final tone changes

ó mà ti dé	> ó mà ti déè	'he has arrived!'

R5. Low-toned verb before noun object
ó rà àlùbǫ́sà > ó ra àlùbǫ́sà 'he bought onions'

R6. Mid-toned subject pronoun before high-toned syllabic nasal
mo ńfẹ́ > mò ńfẹ́ 'I want'

R7. Verb-Object Pronoun tone polarization
ó ti ṣe ḛ > ó ti ṣe é 'he has done it'

ó mọ̀ ọ̀ > ó mọ̀ ọ́ 'he knows it'

R8. Subject-Predicate high-tone junction
Báyọ̀ fẹ́ jáde > Báyọ̀ọ́ fẹ́ jáde 'Bayọ wants to go out'

(Non-tonal P-rules, including Vowel Assimilation Rules as in:

a ò lọ > a à lọ 'we didn't go'
ọmọ tí ẹ rí > ọmọ tẹ́ ẹ rí 'the child you saw'
ó gba owó > ó gbo owó 'he got money')

3.2. Phonetic Tone Rules

R9. Condensation and contraction (or Vowel [-segm.] introduction (¥))

Condensation: ọmọ tẹ́ ẹ̄ rí > ọmọ tẹ́¯ ¥ rí 'the child you saw'
Báyọ̀ọ́ fẹ́ jáde > Báyọ̀¥ fẹ́ jáde 'Bayọ wants to go out'

Contraction: ó rā àlùbǫ́sà > ó r¥̄ àlùbǫ́sà 'he bought onions'
ó gbō ōwó > ó gbō ¥wó 'he got money'

R10. Restricted ¥-deletion rule, see examples of the operation of this rule in different dialects under 5.6 below.

R11. Spreading
bàbá > bábă 'father'
púpọ̀ > púpộ 'plenty'

R12. Linking into glides
ā à lọ > āà lọ 'we didn't go'

R13. Pitch assignment rules
a. Downdrift
[1] slip of low tone
ọ̀rọ̀ [_ _] > [_ _] 'word'

[2] downdrift
ọ̀rọ̀ tí mo sọ [_ _ ¯ — —] > [_ _ ¯ — —]
'the word I said'

b. Pitch adjustment rules

[3] shortening of high-low and low-high glides when not linked to a following tone
kò wǎ [⌣ ⌣] > [⌣ ⌣] 'he didn't come'
but: kò sǐ ibití...[⌣ ⌣] > (unchanged) 'there is no place...'

[4] interaction of consonants and tone
kò wǎ mi [⌣ ⌣ ⌣] > (unchanged) 'he didn't look for me'
but: kò kí mi [⌣ ⌣ ⌣] > [⌣ ¯ ⌣] 'he didn't greet me'

[5] interaction of R9 and R11
kó wǎ [⌣ ⌣] > (unchanged) 'he didn't come'
but: kò wǎlé [⌣ ⌣ ¯] > [⌣ ¯ ¯] 'he didn't come home'

[6] tonal assimilation
àléjò [⌣ ⌣] > [⌣ ⌣ ⌣] 'guest'

[7] second high following low going back to sentence-initial high pitch in final position
kò kí mi mọ́ [⌣ ⌣ ⌣ ⌣] > [⌣ ⌣ ⌣ ¯] 'he doesn't greet me anymore'

[8] two successive low before final high leveling out
ìyàwó [⌣ ⌣ ⌣] > [⌣ ⌣ ⌣] 'wife'

[9] sentence-final pitch lowering
ó fẹ́ rí ọ# [⌣ ⌣ ⌣ ⌣] > [⌣ ⌣ ⌣ ⌣] 'he wants to see you'

[10] reflection of moods of speaker
kò mọ̀ [⌣ ⌣] > [⌣ ⌣] 'he didn't know! (indignation)

.....

R14. ¥-deletion rule, see 5.6 below.

4. Syntactic Tone Rules: Doubts About their Status

The overall ordering of syntactic tone rules before phonetic tone rules is an obvious procedure and probably a language universal. To motivate it, it will be sufficient to point out that tone rules which are related to syntactic processes necessarily operate on a deeper level than rules which are strictly phonetic and therefore low level. E.g. the purpose of R7 is to assign a tone to the object pronouns. This has to be done before the application of R11 affecting high following low, which applies to certain object pronouns. Therefore syntactic rules have to be ordered before phonetic ones. However, it seems that the syntactic tone rules do not have to be ordered relative to each other. Each rule concerns items which, at this point, have no tonal relations.

4.1. A special problem concerning syntactic tone rules is that of cases where a tone is added to an existing structure, sometimes involving the insertion of an extra vowel which is retained into the surface structure. An example is the subject-predicate high-tone junction rule mentioned above (R8). It has increasingly become more accepted that the origin of this high-tone junction is a high-tone subject marker which is underlyingly present in the predicate, and which subsequently assimilates in vowel quality (not tone) to the preceding noun (see Courtenay (1968:70); Fresco (1970:65); Stahlke (1974:173)). In this case we no longer have to treat this high-tone-junction as a tonal phenomenon, but rather as a mere case of vowel assimilation which will be subjected to the condensation, contraction and spreading rules when reaching the phonetic tone rules. The same analysis could be applied to the high-tone-junction verbs (R2), although the nature of the assimilated element is disputed (see Awobuluyi (1970) and Bamgboṣe (1971)). The same is true for the possessive tone junction (R1) where the assimilated segment is probably 'ti', with a low tone for the 1st and 2nd person singular, and a mid tone for the other pronouns and for some noun-to-noun possessive relationships. In the case of the low-tone-junction adjectives (R3) the assimilation process is even clearer because both the assimilated and the unassimilated forms occur synchronically in the language.

A slightly different case is that of the emphatic sentence-final tone changes (R4) which is a case of tone polarization (Bamgboṣe (1966b:45)). There we have to assume the addition of an emphatic marker (a vowel, maybe 'o') to the sentence marked for emphasis. But here a tone rule is needed because the emphatic marker has no constant tone. Its tone is determined by its environment.

Rules which don't require vowel insertion are: the verb-object pronoun tone rule (R7) which assigns tones to object pronouns which polarize with the lexical tone of the verb they accompany; the rule which changes the mid tone of a pronoun to low before a high-toned syllabic nasal (R6); and the rule which changes the low tone of monosyllabic verbs to mid before a noun object (R5).

4.2. Following these considerations, a more radical view of the set of tone rules in Yoruba could be to retain only a set of phonetic tone rules, to which the assigning of a tone to the object pronouns, to the emphatic marker and to the mid-toned pronouns before a high-toned syllabic nasal would be added as mere phonetic processes of polarization. These three rules would have to be ordered before the other phonetic tone rules, however, because of their close relation to syntactic processes, and because they provide input for the other phonetic rules. We would have excluded from the tone rules, therefore, all the so-called syntactic tone rules which require a vowel insertion prior to the assignment of a new tone to the construction. The only remaining syntactic rule is R5 (a low-toned verb becoming mid before a noun object) which apparently has neither a phonetic function, nor does

it require the insertion of a vowel. This rule would, therefore, have to be assigned the status of the only syntactic tone rule in Yoruba. This would be a doubtful situation, however, which would invite further research and the possible eventual inclusion of this rule with the vowel insertion type, which would exclude it from the tone rules. This would leave us with a greatly reduced set of tone rules, all phonetic:

1. Verb-Object Pronoun tone polarization
2. Emphatic sentence-final tone changes
3. Mid-toned subject pronoun before high-toned syllabic nasal
4. Condensation/Contraction rule
5. Restricted ɨ-deletion rule
6. Spreading
7. Linking into glides
8. Pitch assignment rules
9. ɨ-deletion rule

Non-tonal P-rules are ordered before this set. To avoid confusion, in the remainder of this paper we will still refer to the rule numbering given earlier.

5. Phonetic Tone rules

The ordering of the phonetic tone rules is intricate and controversial. The main problems arise from the interaction of non-tonal P-rules and tonal P-rules. As an illustration of the difficulties we list here the set of ordered rules given by Courtenay (1968:50). The application of her rules to all the possible cases of high with non-high tonal contractions point to the problems that exist: ('terracing' is downdrift, 'glide' is spreading)

Underlying	lí ọkọ	lí ọkọ́	lí ọkọ̀	lí ò̩kò	lí ò̩la	lí ànná
After P-r.	lọ́kọ	lọ́kọ́	lọ́kọ̀	lọ́ Ø̀kọ̀	lọ́ Ø̀la	lá Ø̀ná
Terracing	-	-	-	-	lọ́ Ø̀'la	lá Ø̀'ná
Ø-deletion	-	-	-	lọ́kò	lọ́'la	lá'ná
glide rule	-	-	lọ́kộ	lọ́kộ	-	-
derived	lọ́kọ	lọ́kọ́	lọ́kộ	lọ́kộ	lọ́'la	*lá'ná

The ordering suggested in this paper, which will be exemplified with the same data below, has the following characteristics:

5.1. The non-tonal P-rules include vowel assimilation rules. The output of these rules are vowel pairs consisting of two vowels that are identical as to their non-tonal features. Some of these vowel pairs will later in R9 be subjected either to condensation, which means that one of them will become non-segmental while the other will carry the tonal features of both, or to contraction, which means that one of the vowels becomes non-segmental while keeping its tonal features. Later, R10 and R14 will delete the non-segmental vowels originating from both condensation and contraction.

This approach means that instead of three groups of P-rules, i.e. (1) vowel assimilation rules (the first of which commonly reads: the vowel [i] assimilates in quality to a neighboring vowel), (2) vowel contraction rules (the first of which--again--usually reads: the vowel [i] is deleted in a contraction with another vowel), and (3) tonal condensation/contraction rules, we now only have two: (1) vowel assimilation rules which are non-tonal P-rules and which establish pairs of identical vowels, and (2) condensation/contraction rules which operate on these pairs and are governed by tonal rules. It is of course the assimilation rules which will carry the burden of determining the quality of the vowel which will be kept after the contraction rules have operated since the latter only operate between vowels that have the same non-tonal features. As can be seen already from the rules concerning the vowel [i] above which have now been collapsed in the assimilation rules, this procedure is more economical.[3]

The rules concerning the choice of the vowel and its tone which is to become non-segmental in contraction (and therefore to be deleted) are general and without apparent exceptions. These rules will be similar, of course, to the rules which governed the behavior of tones in vowel contraction as described traditionally. E.g. traditionally, a rule would state that in a contraction between a high tone and a mid tone, the mid tone will be deleted. We now say that the vowel carrying the mid tone becomes non-segmental.

5.2. After the condensation/contraction rule, there is a rule (R10) concerning the deletion of Ɣ in certain environments. This rule is general in some Yoruba dialects (all Ɣ deleted before low-toned vowel, as e.g. in the dialect Courtenay was dealing with), it is selectively applied in others (Bamgbọṣe's dialect, see Bamgbọṣe (1966a), where the restriction is that Ɣ is deleted before low-toned vowels only if itself has a non-low tone), and not applied elsewhere. All outputs have been recorded and are included in the examples given under 5.6. below.

5.3. High-low and low-high glides are introduced through the spreading rule (R11), while all other glides originate through the linking rule (R12) which governs the mere linking up, or slurring, in vowel quality and tone of all contiguous vowels. It would be possible to introduce <u>all</u> glides through the linking rule, and in order to account for the fact that spreading occurs across consonant boundaries, to analyze it as Fresco does[4] by prefixing to the second vowel an extra vowel of the same quality but with the tone of the previous vowel. Linking would later provide the glide, and another rule reducing the length of the glide would give the correct surface output. However, since we may have opted above (4.2.) not to use vowel insertion rules in order to account for tonal changes, it seems better to keep spreading as an independent glide introduction rule. This implies that we are assigning to the low-high and the high-low glides a different status from the other glides in Yoruba.

5.4. The set of rules under R13 can be grouped together. They are the rules that assign phonetic pitches to the vowels bearing the tones.

5.4.1. The slip rule and downdrift rule must be viewed as one process. By slip rule is meant that all low tones end on a slightly lower pitch level than the one they started on, while mid and high tones are always level. This way of analyzing the low tone has already been suggested by J. Stewart (1971:185) and was further described by Hombert during this conference. Downdrift is then a quasi-automatic process if we assume a fixed L-H and L-M pitch interval, since the reference point for the H's and the M's (the preceding L) has been lowered.

5.4.2. The remaining pitch assignment rules could be called pitch adjustment rules, because they operate on the rigorous tonal framework that has been set up so far, by introducing certain low level adjustments in the pitches that have been assigned. The pitch adjustment rules are only roughly ordered here, and the set is certainly incomplete. More detailed research, including the study of dialectal variations and speech tempo, has to be done in this area of tonal phonetics.

5.5. Finally we have the usual clean-up rules where, among other things, the non-segmental vowels, with or without tones, are deleted (R14).

5.6. We can now study the effects of the application of the rule ordering suggested here on the examples used above under 5. The scope of R10 is different for different dialects (see 5.2. above), so we have different sets of data for rules 10-14. Linking (R12) and pitch adjustments of R13 have not been represented.

Underl.	lí ọkọ	lí ọkọ́	lí ọkǫ̀	lí ǫ̀kǫ̀	lí ǫ̀la	lí ànà
Assim.	lǫ́ ọkọ	lǫ́ ọkọ́	lǫ́ ọkǫ̀	lǫ́ ǫ̀kǫ̀	lǫ́ ǫ̀la	lá ànà
R9 contr.	lǫ́ ɣkọ	lǫ́ ɣkọ́	lǫ́ ɣkǫ̀	lǫ́ ɣ̀kǫ̀	lǫ́ ɣ̀la	lá ɣ̀nà

a. Courtenay

R10	-	-	lǫ́kǫ̀	lǫ́kǫ̀	-	-
R11	-	-	lǫ́kǫ̂	lǫ́kǫ̂	-	lá ɣ̀nă
R13	-	-	-	-	lǫ́ ɣ̀'la	lá ɣ̀'nă
R14	lǫ́kọ	lǫ́kọ́	lǫ́kǫ̂	lǫ́kǫ̂	lǫ́'la	lá'nă

b. Bamgbose

R10	-	-	lǫ́kǫ̀	-	-	-
R11	-	-	lǫ́kǫ̂	-	-	lá ɣ̀nă
R13	-	-	-	lǫ́ ɣ̀'kǫ̀	lǫ́ ɣ̀'la	lá ɣ̀'nă
R14	lǫ́kọ	lǫ́kọ́	lǫ́kǫ̂	lǫ́'kǫ̀	lǫ́'la	lá'nă

c. Other

R10	(not applied)					
R11	-	-	-	-	-	lá Ɨnã̌
R13	-	-	-	lọ́ Ɨ'kọ̀	lọ́ Ɨ'la	lá Ɨ'nã̌
R14	lọ́kọ	lọ́kọ́	lọ́kọ̀	lọ́'kọ̀[5]	lọ́'la	lá'nã̌

Glosses:
'to have a husband, hoe, truck, spear' 'tomorrow' 'yesterday'

6. Conclusion

In this paper an attempt was made--maybe for the first time--to account for all existing tone rules of Yoruba and to categorize them. Without going into the mechanics of each rule, the paper then tried to set up a motivated basis for the ordering of these rules, leaving only one well delimited area vague (the pitch adjustment rules). The measure of the paper's validity depends, therefore, on the completeness of the listing and the validity of the established categories, as well as on the rule ordering itself.

Footnotes

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[1]Terminology suggested by L. Hyman (1973 and personal communication).

[2]The symbols used in this paper are the following:

[´]: high tone	['] the following tone is subjected to downdrift
[`]: low tone	[Ɨ]: Vowel [-segmental]
[ ] or [¯]: mid tone	[ẹ], [ọ] and [ṣ]: [ɛ], [ɔ] and [ʃ] respectively.
[ˆ]: high-low glide	
[ˇ]: low-high glide	
[∅]: vowel with no assigned tone	[Vn]: a nasalized vowel

[3]Vowel contraction and assimilation in Yoruba has been abundantly treated elsewhere, see e.g. Bamgboṣe (1965); Courtenay (1968:55f.); Oyelaran (1971:165f.).

[4]Discussed by Courtenay (1968:92).

[5]The output of R14 here suggests the existence of a surface tonal distinctiveness between an ordinary slipped L after H (lọ́kọ̀) and a slipped L with downdrift (lọ́'kọ̀). From data recorded, however, I think we are here in an undefinable area of idiolectical changes and free variation.

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